

**INTERVIEW SUMMARY**

On July 6, 2007, Robert Mauri conducted a telephone interview with the Examiner. At that time, a proposed amendment to claim 1 was discussed. The Examiner did not agree that the proposed amendment would overcome the §101 rejections. No agreement was reached.

**REMARKS:**

All references made below with respect to the specification of the instant application are made with regards to U.S. Patent Application Publication No. 2005/0222825, the publication corresponding to the instant application.

Claims 1, 2, 9, 10, 17 and 18 are amended herewith. No new matter is added.

Note that claim 1 has been amended to recite in part: "A method to determine information indicative of at least one property of a physical entity by utilizing a linear system of equations to represent the physical entity... wherein the at least one property comprises one of a fluid mechanical property, an acoustical property or a field scattering property of a radar-related component..." Note that independent claims 9 and 17 do not include subject matter corresponding to this portion of claim 1.

The Examiner rejected claims 1-24 under 35 U.S.C. §101 as being directed to non-statutory subject matter. The Examiner further rejected claims 1-24 under 35 U.S.C. §101 as preempting a 35 U.S.C. §101 judicial exception (a mathematical algorithm). The Examiner rejected claims 1-24 under 35 U.S.C. §102(b) as being anticipated by Ushiro. These rejections are respectfully disagreed with and are traversed below.

**(A) §101 REJECTIONS**

The arguments submitted in the previous Response to Office Action with regards to the §101 rejections are herein incorporated and applied to the current §101 rejections.

Without any admissions, independent claims 1, 9 and 17 are amended herewith to more clearly recite the claimed subject matter. It is believed that these amendments, in part, will further prosecution of the application and obviate the alleged §101 subject matter issues.

For example, claim 1 now recites in part:

A method to determine information indicative of at least one property of a physical entity by utilizing a linear system of equations to represent the physical entity, the method comprising:

...

using at least the linear system matrix A and the preconditioner, determining an approximate numerical solution of the linear system of equations, wherein the approximate numerical solution comprises the information indicative of at least one property of the physical entity, wherein the at least one property comprises one of a fluid mechanical property, an acoustical property or a field scattering property of a radar-related component; and

outputting the approximate numerical solution.

It is submitted that claim 1 produces a useful, concrete, tangible result.

**(B) §102(b) ANTICIPATION BY USHIRO**

**(B)(i) INDEPENDENT CLAIMS 1, 9, 17**

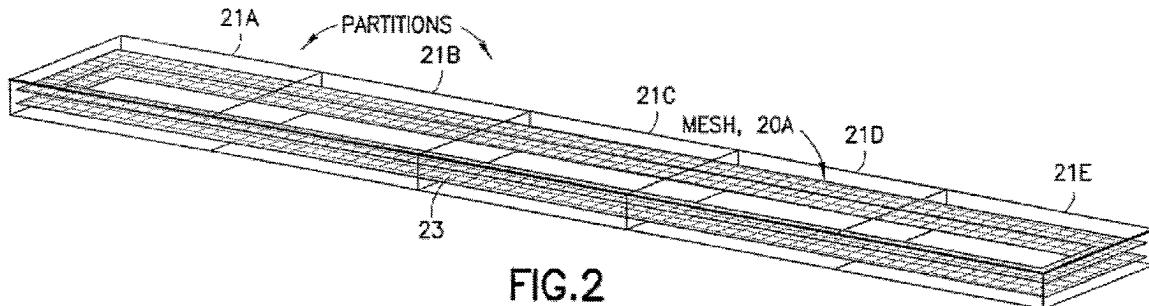
Claim 1 will be considered as representative of the rejected independent claims.

In alleging that Ushiro anticipates claim 1, the Examiner implicitly equates mesh elements to partitions. It is submitted that these divisional elements are *not* equivalent. Furthermore, the specification of the instant application clearly describes the difference between them.

Consider the mesh 20A and its generation. The mesh 20A refers to a union of a plurality of mesh elements. The mesh elements, collectively referred to as the mesh or mesh representation, are a

construct generated by the mesh generator 20. The mesh generator 20 divides a description 10 of a physical structure of interest into said mesh elements to form the mesh 20A. See para. [0021]. These mesh elements are similar to the prior art elements described in paragraph [0003] "over which the properties are considered to vary in a known manner and to which classical principles can be applied to yield a system of linear algebraic equations."

FIG. 2 of the instant application, and the discussion thereof, is particularly germane to this issue. FIG. 2 is reproduced immediately below for the Examiner's convenience.



"FIG. 2 is a depiction of the splitting of a mesh into regions or partitions for preconditioning." Para. [0015]. That is, the mesh 20A that is output from the mesh generator 20 is split into a plurality of partitions by a mesh splitting function 40. In FIG. 2, the physical mesh 20A is split into five distinct partitions 21A, 21B, 21C, 21D and 21E, collectively referred to as partitions 21. ***Note that each partition may comprise several mesh elements.*** See para. [0022].

Thus, based on the above explanations which are themselves based on language in the specification, it is apparent that **mesh elements and partitions are two distinct divisions**. Further note that original claim 1 (i.e., claim 1 as filed) recited two different steps that effectively provide for these two different divisions: "generating a mesh representation of the physical entity, the mesh representation comprising mesh elements" and "partitioning the mesh representation into a plurality of partitions."

In contrast to the subject matter recited by the independent claims (see, e.g., claim 1) of the

instant application, **Ushiro only discloses the use of one division.** That is, the sub-areas Ushiro describes (col. 8, lines 32-50) and shows in FIG. 5 correspond to the mesh elements of the instant application. Ushiro does not disclose or suggest a second, different division. Furthermore, Ushiro does not disclose or suggest a second type of division in which one second unit may comprise a plurality of first units from a first division.

Ushiro does not disclose or suggest "partitioning the mesh representation into a plurality of partitions separated by partition boundaries," as recited in claim 1, for example. Ushiro also does not disclose or suggest "computing, using at least the plurality of partitions, a preconditioner for the linear system matrix  $A$  that is compatible with the linear system of equations and that provides at least basis function support over at least two mesh elements, where coupling of the preconditioner between partitions is only through basis functions at the partition boundaries," as recited in unamended claim 1, for example.

Furthermore, and based on the above, Ushiro does not disclose or suggest "using at least the linear system matrix  $A$  and the preconditioner, determining an approximate numerical solution of the linear system of equations," as recited in claim 1, for example.

The features recited in claim 1 are not disclosed or suggested in the cited art. Ushiro certainly does not anticipate claim 1. Therefore, claim 1 is patentable and should be allowed.

Though dependent claims 2-8 contain their own allowable subject matter, these claims should at least be allowable due to their dependence from allowable claim 1. However, to expedite prosecution at this time, no further comment will be made except as noted below.

Independent claims 9 and 17 recite subject matter similar to claim 1. For the reasons stated above with respect to claim 1, Ushiro cannot be seen to anticipate claims 9 and 17. Independent claims 9 and 17 are similarly patentable and should be allowed.

Though dependent claims 10-16 and 18-24 contain their own allowable subject matter, these

claims should at least be allowable due to their dependence from allowable claims 9 and 17, respectively. However, to expedite prosecution at this time, no further comment will be made except as noted below.

It is also submitted that Ushiro does not disclose or suggest "A method to determine information indicative of at least one property of a physical entity by utilizing a linear system of equations to represent the physical entity... wherein the at least one property comprises one of a fluid mechanical property, an acoustical property or a field scattering property of a radar-related component," as recited in claim 1. Note that independent claims 9 and 17 do not include subject matter corresponding to this portion of claim 1.

**(B)(ii) CLAIMS 2, 10, 18**

It is submitted that Ushiro does not disclose or suggest "where the preconditioner is itself a valid solution to the same set of physical equations that govern the full linear system," as recited in unamended claim 2, for example. The Examiner fails to identify any specific disclosure (e.g., specific words or sentence) that allegedly correspond to the subject matter recited in claim 2. In particular, Ushiro does not indicate that the preconditioner itself may comprise a solution. In fact, step 16 of FIG. 4 in Ushiro utilizes the preconditioning *to obtain a solution*. Claim 2 is patentable and should be allowed. Claims 10 and 18 recite similar subject matter and, for the reasons stated above with respect to claim 2, are similarly patentable and should be allowed.

Should the Examiner maintain the rejection of claims 2, 10 and 18 in view of Ushiro, it is requested that the Examiner more particularly identify the specific portion of Ushiro that is alleged to disclose the claimed subject matter.

**(B)(iii) CLAIMS 3, 11, 19**

It is submitted that Ushiro does not disclose or suggest "where computing a preconditioner operates to compute a preconditioning matrix  $K$  where partition boundaries are constrained to

coincide with the edges of mesh elements, and to compute mesh element interactions using reduced coupling," as recited in claim 3, for example. The Examiner fails to identify any specific disclosure (e.g., specific words or sentence) that allegedly correspond to the subject matter recited in claim 3. Since Ushiro does not disclose the use of partitions and mesh elements, Ushiro cannot be seen to disclose subject matter concerning a relationship between partitions and boundaries such as computing "a preconditioning matrix  $K$  where partition boundaries are constrained to coincide with the edges of mesh elements," for example. Claim 3 is patentable and should be allowed. Claims 11 and 19 recite similar subject matter and, for the reasons stated above with respect to claim 3, are similarly patentable and should be allowed.

Should the Examiner maintain the rejection of claims 3, 11 and 19 in view of Ushiro, it is requested that the Examiner more particularly identify the specific portion of Ushiro that is alleged to disclose the claimed subject matter.

**(B)(iv) CLAIMS 4, 12, 20**

It is submitted that Ushiro does not disclose or suggest "where mesh element interactions between basis functions are computed only for half functions within the same partition, where a half function denotes the function over any one of multiple mesh elements for which it is defined, and where the interactions of basis functions crossing a partition boundary are computed separately for each of the half functions such that no interactions exist between basis function halves that are defined in separate ones of the partitions, and those basis functions completely within a partition, referred to as interior elements, interact only with other interior elements and with boundary element halves within the same partition," as recited in claim 4, for example. The Examiner fails to identify any specific disclosure (e.g., specific words or sentence) that allegedly correspond to the subject matter recited in claim 4. Since Ushiro does not disclose the use of partitions and mesh elements, Ushiro cannot be seen to disclose computing mesh element interactions between basis functions only for half functions within the same partition. Claim 4 is patentable and should be allowed. Claims 12 and 20 recite similar subject matter and, for the reasons stated above with respect to claim 4, are similarly patentable and should be allowed.

Should the Examiner maintain the rejection of claims 4, 12 and 20 in view of Ushiro, it is requested that the Examiner more particularly identify the specific portion of Ushiro that is alleged to disclose the claimed subject matter.

**(B)(v) CLAIMS 5, 13, 21**

It is submitted that Ushiro does not disclose or suggest "further comprising sorting indices of basis functions in the matrices  $A$  and  $K$  so that all internal elements appear first, grouped according to their respective partitions, followed by all boundary elements, and where a resulting preconditioning matrix  $K$  for  $n$  partitions has the form [as shown in claim 5 above]," as recited in claim 5, for example. The Examiner fails to identify any specific disclosure (e.g., specific words or sentence) that allegedly correspond to the subject matter recited in claim 2. Since Ushiro does not disclose the use of partitions and mesh elements, Ushiro cannot be seen to disclose grouping internal elements according to their respective partitions. Furthermore, Ushiro does not disclose the use of internal elements, as described in the instant application and as recited in claim 5. Claim 5 is patentable and should be allowed. Claims 13 and 21 recite similar subject matter and, for the reasons stated above with respect to claim 5, are similarly patentable and should be allowed.

Should the Examiner maintain the rejection of claims 5, 13 and 21 in view of Ushiro, it is requested that the Examiner more particularly identify the specific portion of Ushiro that is alleged to disclose the claimed subject matter.

**(B)(vi) CLAIMS 7, 15, 23**

It is submitted that Ushiro does not disclose or suggest "where the linear system matrix  $A$  is partitioned in the same manner as the preconditioner using the same partitions, separate partitions, or a combination of the same and separate partitions," as recited in claim 7, for example. The Examiner fails to identify any specific disclosure (e.g., specific words or sentence)

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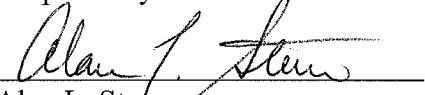
that allegedly correspond to the subject matter recited in claim 2. Since Ushiro does not disclose the use of partitions and mesh elements, Ushiro cannot be seen to disclose partitioning the linear system matrix  $A$  in the same manner as the preconditioner based on partitions. Claim 7 is patentable and should be allowed. Claims 15 and 23 recite similar subject matter and, for the reasons stated above with respect to claim 7, are similarly patentable and should be allowed.

Should the Examiner maintain the rejection of claims 7, 15 and 23 in view of Ushiro, it is requested that the Examiner more particularly identify the specific portion of Ushiro that is alleged to disclose the claimed subject matter.

### (C) CONCLUSION

The Examiner is respectfully requested to reconsider and remove the rejections of claims 1-24 and to allow all of the pending claims 1-24 as now presented for examination. For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record. Should any unresolved issue remain, the Examiner is invited to call Applicants' agent at the telephone number indicated below.

Respectfully submitted:

  
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